Foreign Exchange Exposure: Evidence of Thailand Foods and Beverages Industry

Suvisa Vathananond *

I. Introduction

As an agricultural country, Thailand's economic crops such as rice, sugar cane, corn, tapioca, and rubber as well as livestock and fishery products bring in major annual income to the country.[1] Since the 1960s, sugar cane and corn production increased due to higher demand from the world market. After the 1970s onward, government promoted agricultural business, which later became fully developed. As a labor incentive country that has enormous natural resources, the food products of Thailand have comparative advantage among other nations. In later years, foreign demand for agricultural products expands from raw to processed products such as processed vegetables and fruits. By the mid 90s, production of food products nearly tripled and in the year 2000 there were over 10,000 food manufacturing companies in Thailand. As such, Thai government announced several measures in 2000 to boost agribusiness which resulted to the increase in firm's revenue.

Since the breakdown of the fixed exchange rate regime on 2nd of July 1997, Thai economic environment has been characterized by substantial exchange rate volatility. During the Asian financial crisis in 1997 and thereafter, Thailand floated its currency. Real exchange rate translates into lower purchasing power parity (PPP) and price of goods and services are much cheaper for foreign demand. The currency depreciated from 25 baht to around 55 baht per a US dollar in January 1998. Firms in Stock Exchange of Thailand seem to be hit hard by the financial crisis. These raise questions to what extend firm's stock return

* Ph. D. student in Graduate School of Public Administration at International Christian University

sensitive to the foreign exchange changes, what determines foreign exchange exposure, and whether hedging could effectively reduce exposure of firms if they do.

This study investigates ten firms in the foods and beverages industry of Thailand and documents significant exchange exposure in the year 1994-2001. Several studies have investigated foreign exchange exposure among different industries. Bodnar and William (1993) study the industry characteristics with exchange rate exposure by using sample from Canada, Japan and US. Choi and Prasad (1995), Marston (1996), Griffin and Stulz (2001) investigate firm and cross country industry level with exchange rate exposure. Chamberlain, Howe, and Popper (1996) compare stock return movement with exchange rate changes of United States bank holding company to Japanese bank. Tufano (1998) examines the stock price exposure on Gold Mining Industry. Williamson (2000) looks at competitive and exposure of automotive industry between United States and Japan. Yoon (2003) examines industry exposure by using data from firms in Korean Stock Exchange.

Figure 1: Logarithmic change series of foreign exchange rate, Thai Baht in the value of a US dollar from 1994-2001.

$$Fx = \log\left(\frac{s_t}{s_{t-1}}\right) * 100,$$

where Fx = percentage of the return on exchange rate,
s_t = spot exchange rate, and
t = time period.
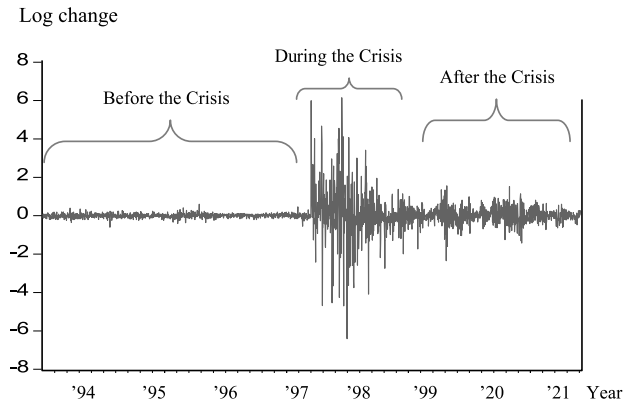
Other studies have turned to model specification in order to find more significant beta exposure. He and Ng (1998) use lagged of exchange rate change on stock return to capture the time variation. Allayannis and Weston (2001) exams the relationship between exposure and hedging policy to answer whether firm use foreign currency derivatives for hedging or for speculative purpose. Bodnar and Marston (2000) simply reveal level of involvement in foreign activity and its channel of exposure. Choi, Hiraki and Takezawa (1998), show that foreign exchange exposure can be measured and priced in the Japanese market.

There are three explanations why this study is important. One explanation for previous studies concern with the model selection is that none of the studies use daily return during crisis period whereby volatility is high on a daily basis.

Monthly and yearly return for study of foreign exchange exposure would not capture abnormal return period. Second explanation is that in the context of exchange exposure, this study investigates the financial and operational hedging to hypothesis whether hedging does reduce firm's exposure if they do. Lastly, there is no related work to ever document information on hedging, operational hedging, and export ratio of Thailand during 1994- 2001 to study exposure impact of those variables. This area will benefit researchers especially those engaged in foreign exchange exposure on event study, risk management policy, macroeconomic policy, portfolio management as well as model for foreign exchange products.

I. 1 Why study on Food and Beverage Sector?

This study looks at food and beverages companies because it is a subsection in agribusiness industry which contributes significantly to Thailand's growth. Thailand's agriculture is an important food supply to address the demand from both the domestic and global market. To examine how firm behavior reacts on its foreign exchange exposure, the study intends to reveal the impact of firm's financial structure to explain foreign exchange exposure in three subperiods, which brings to light the sensitivity of the changes in exchange rates as well as hedging strategy in industry level among the firms in the portfolio.

Even though it was more advantageous to the depreciation of Thai baht for exporting firms, the inflation and high labor cost during financial crisis led firms to lower its comparative advantage to China, Indonesia and Philippines.[2] Foreign exchange risk through both direct and indirect effect is a unique dimension in international financial business. The lack of understanding the sensitivity of financial structure of Thai's specific industry and its hedging effective on foreign exchange changes causes difficulty in making investment and currency risk management decision for domestic as well as foreign investors.

II. Data

The sample in this study includes ten companies in food and beverages industry that are listed in the Stock Exchange of Thailand (SET) between July 1994 to December 2001. Descriptive statistic for firms in portfolio is found in Table 1. This study obtains daily data from the Pacific-Basin Capital Markets (PACAP) database, which is maintained at the University of Rhode Island. Data items contain extensive company information for Thailand. Since the hedging policy and export sale are only be accessed in SET library, data from each annual reports were manually collected.

The separation of three subperiods were chosen according to the World Bank report (2001) by measuring it with real exchange rate, foreign dominated debt, GDP growth, interest rate, consumption and trade balance.

All firms in the sample are are listed in the stock exchange of Thailand from July 1994 – December 2001. Firms must have certain number of days that the movement of stock returns greater than 20% of the total trading days in each subperiod. For example, given that firm has 450 trading days during the crisis from July 1997 to December 1998, after cutting the zero return of stock value which more than 5 consecutive days, if the remaining days are less than 90 days then that firm will be excluded from the sample.

Table 1: Descriptive Statistics

	Before Crisis		During Crisis		After Crisis	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Exposure Beta	0.315	1.154	0.068	0.600	-0.054	0.470
Size (logarithm of Total Sales)	2,129,541	2,004,307	1,569,620	2,947,983	1,468,467	1,733,483
Export Ratio (Export/Total Sales)	0.281	0.337	0.338	0.325	0.202	0.287
DE (Debt to Equity Ratio)	1.31	1.303	1.036	0.853	118.709	371.529
No. of Observation	10		10		10	

Table 2. Portfolio information

There are ten firms in the sample are as follows.

Stock Abbreviations	Company names
APURE	AGRIPURE HOLDINGS PUBLIC COMPANY LIMITED
LST	LAM SOON (THAILAND) PUBLIC COMPANY LIMITED
MALEE	MALEE SAMPRAN PUBLIC COMPANY LIMITED
POMPUI	KUANG PEI SAN FOOD PRODUCTS PUBLIC COMPANY LIMITED
S&P	S & P SYNDICATE PUBLIC COMPANY LIMITED
SSC	SERM SUK PUBLIC COMPANY LIMITED
TC	TROPICAL CANNING (THAILAND) PUBLIC COMPANY LIMITED
TUF	THAI UNION FROZEN PRODUCTS PUBLIC COMPANY LIMITED
TVO	THAI VEGETABLE OIL PUBLIC COMPANY LIMITED
UFM	UNITED FLOUR MILL PUBLIC COMPANY LIMITED

III. Model Exchange Rate Exposure

III. 1 A two-factor model, where R_{it}, the return on firm i's stock return at time t, is a linear regression function of the return on exchange rate, R_{xt}, and market return, R_{mt}, is described below:

$$R_{it} = \beta_0 + \beta_{xt} R_{xt} + \beta_{mt} R_{mt} + \varepsilon_t$$

R_{mt} is recommended by Bodnar and Wong (2000) to measure market capitalization and exposure. The coefficient β_{xt} and β_{mt} are the measurement of exchange risk sensitivity and Market-risk of firm i. This is the equation to measurement of factor sensitivity. Jorion (1990), Bartov and Bodnar(1994), Choi and Prasad (1995), Pantzalis, Simkins and Laux (2001), Bodnar and Wong (2000), Griffin and Stulz (2001) and many more recommend the effects on firm value of exchange rate changes.

$$R_{it} = \beta_{oi} + \beta_{xt} R_{xt} + \beta_{mt} R_{mt} + \varepsilon_{it} + \beta_{\varepsilon t} \varepsilon_{i(t-1)} \ldots\ldots\ldots\ldots.(1)$$
$$t = 1, \ldots\ldots, T,$$

where R_{it} is return on firm's stock value, R_{mt} is market portfolio return, R_{xt} is return on foreign exchange, T is daily time horizon, i = number of firms and ε_{it},

and $\varepsilon_{i\,(t-1)}$ are the error terms. An involvement in MA(1) model is to capture the correlation of variance from t-1 period.

Bodnar and Kaul (1996) and Chow, Lee and Soil (1997) study on beta exposure and find that firm's exposure changes over different and longer time frame. Ihrig and Prior (2003) study exposure of U.S. nonfinancial multinationals and find small number of firms have significant exposure only in crisis period and some others have significant exposure only during normal fluctuations in exchange rate. Muller and Verschoor (2004) find that small U.S. companies were strongly exposed to foreign exchange exposure during the Asian financial crisis. This finding also consistent with Parsley and Popper (2003), who study cross-country exposure and find that exchange rate sensitivity is the highest during the Asian Crisis period.

III. 2 Firm-Specific Determinants (Cross-section analysis) is employed as a second step approach where dependent variable is $\hat{\beta}_{xi}$ exposure beta and independent variables are firm financial structure and financial and operational hedging. The focus of the literature that examine the economic important of exposure is on calculating the fraction of the variation of an industry's on an individual firm's stock return that is related to exchange rate changes.

$$\hat{\beta}_{xi} = a_0 + a_1\text{SIZE} + a_2\text{EXP} + a_3\text{DE} + a_4\text{FH} + a_5\text{OH} + \omega_{ai,\,T} \quad \ldots\ldots\ldots(2)$$

where explanatery variables are: firm size (SIZE), export ratio (EXP), debt to equity ratio (DE), financial hedge (FH), and operational hedge (OH).

Pantzalis, Simkins and Laux (2001) argue in their study that the exposure is related to the use of operation hedging, where geographical diversification leads to less exposure to foreign exchange risk. An operational hedge, OH, is when a firm can manage its risk exposure by locating production in a country where significant sales revenues in the local (i.e., foreign) currency are expected. OH is calculated by using the geographic dispersion of its subsidiaries across different countries (Dispersion Index). Operational hedges are also the motive for direct investment and the existence of multinational firms. Carter, Pantzalis and

Simkins (2003) study on French multinational firms and find that both financial and operational hedges can be effective in reducing foreign exposure across weak and strong currency states.

Geographic dispersion of its subsidiaries across countries is constructed with Hirschman- Herfindahl concentration index over all the countries or regions in which a firm operates. Dispersion Index is used to calculate the operational hedging as follows.

$$\text{Operational Hedging} = 1 - \sum_{n=1}^{k} \left[\frac{(\#subsidiaries)_n}{(Total\#subsuduaries)_n} \right]^2$$

Where k presents the total number of countries in which firm n operates. This measure has value close to 1 if the firm has subsidiaries in many countries and a value of zero if the firm has subsidiaries in only one country.

III. 3 Determinants of Foreign Exchange Exposure

Firm size is calculated by logarithm of firm's total sale. Bodnar and Wong (2000) study how firm size can explain the level of exposure. They find that small firms, which have potential as net importers and non-traded good producers, have a high chance of exposure to the exchange rate movement.

Foreign Sale is measured by export ratio. Whether exchange rate exposure is related to the degree of foreign involvement, this can be measured by foreign sale operation. Bodnar and Gentry (1993), Bartov and Bodnar (1994), Chow, Lee and Soil (1997), and Martin et al (1999) also support the same study. Choi and Prasad (1995) studied the degree of exposure with degree of foreignness through the sizes of foreign sales, assets and profit. They found that firm with minimize foreign sale but facing significant import competition may experience more exposure than firms with significant in foreign sale.

Debt to equity ratio is a good indicator for determination of financial distress. This ratio helps measure a firm's probability of financial distress. He and Ng (1998) find that high leveraged firms, smaller firms or firms with weak short

term liquidity positions have lower exposures to exchange rate risk. Because firms with a high degree of leverage are likely to have financial distress, and are more likely to hedge to reduce the volatility of their earnings. Firm, therefore; expects to maintain growth opportunities and liquidity, therefore; it has more incentive to use financial derivatives, Nguyen, Faff and Marshall (2004).

III. 3 Logit regression is used in the third step to measure the incentive to hedge firm in food and beverage industry. Running Logit regression provides factors for decision to use hedging. This could also provide an alternative analysis for financial risk manager to improve the planning capability of the firm.

$$FH = h_0 + h_1 SIZE + h_2 EXP + h_3 DE + h_4 \hat{\beta}_{xi} + \omega_{ri, T} \quad \ldots\ldots\ldots(3)$$

This regression estimates of the relation between the likelihood that a firm uses financial hedges to hedge and proxies for incentives to hedge and proxies for foreign exchange exposure. financial hedging, FH, exposure hedging as the dependent variable. The explanatory variables are: firm size (SIZE), export ratio (EXP), debt to equity ratio (DE), and foreign-exchange exposure beta ($\hat{\beta}_{xi}$).

IV. Empirical Result

Results consist of three findings. The first result is from using time series regression to estimate foreign exchange exposures of ten foods and beverages firms. Second result is from using cross-sectional regression analysis to determine the exposures from firm's financial structure. The last result comes from the logit regression for the determinant of incentives to hedging.

IV. 1 Foods and Beverages Firms' Foreign Exchange Exposure

To test the sensitivity of firm's stock return on exchange rate changes, the study obtain beta exposure by running time series regression from equation (1). The result is estimated from the foreign exchange exposure using daily returns in a two factor model framework. Table 1 and Figure 1 show an interesting finding that although the fluctuation of exchange rate before the crisis is very small due

to fixed exchange rate regime but an average coefficient is the highest at 0.315, compared with other subperiods.[3] An exposure coefficient reduces to 0.068 and becomes -0.054 after the crisis period. This means structure of macroeconomic changes the firm's level of exposure. The depreciation of baht made domestic borrowers have higher burden to pay back its foreign currency loan. Increasing in debt to equity ratio in after the crisis period could explain the changing in direction of exchange rate exposure, see Table 1. Debt to equity ratio increases over 100% from 1.036 to 118.709. Another reason is firm's stock value decline due to financial crisis; therefore, decrease in its equity value.

IV. 2 Determinants of Foreign Exchange Exposure

In Table 3, none of the proxy variables exhibit significant explanatory power in the third subperiod. During the crisis period, export ratio, debt to equity and operational hedge significantly explain firm's foreign exchange exposure. The coefficient of the Export Ratio yields significant a positive sign of 1.636 in Table 3 Panel A. Consistent with previous research, Bodnar and Marston (2000) and many others, firm with high degree of foreign involvement experiences high impact of foreign exchange exposure.

Coefficient of debt to equity ratio yields significant a negative sign of -0.349. This means that firm with higher leverage has less expose to foreign exchange changes. Because firm with high debt position has higher possibility of financial distress, thus, firm tends to hedge and level of exposure decrease. Operational Hedge coefficient shows significant a negative sign of -1.097. The more firm diversify its subsidiaries into countries where revenue generated the more firm reduce its exposure.

IV. 3 Reasons to engage in Financial Hedge

The study further observe into three sections depends on periods. The estimated beta is then regressed on set explanatory valuables to answer whether firm engage in finance hedging can reduce exposure, if they do? Can exposure be determined by firm financial character differently between firm with hedging and no hedging?

Table 3: Determinants of the Exchange-Rate Exposure

This table reports estimates of the relationship between the exposure coefficients $\hat{\beta}_{xi}$ and the variables that are proxies for firms hedging incentives, such as the firm's market value of equity (SIZE), export ratio (EXP), and debt to its market value of equity (DE). Their empirical relationship is described as below:

$$\left|\hat{\beta}_{xi}\right| = a_0 + a_1 \text{SIZE} + a_2 \text{EXP} + a_3 \text{DE} + a_4 \text{FH} + a_5 \text{OH} + \omega_{ai,\,T}$$

$$\text{and } \hat{\beta}_{xi} = a_0 + a_1 D\text{SIZE} + a_2 D\text{EXP} + a_3 D\text{DE} + \omega_{ai,\,T}$$

where D presents a dummy variable that takes the value of one if $\hat{\beta}_{xi}$ is positive and zero if otherwise. T-statistics are shown in parentheses.

		Panel (A): Thai Baht Exchange Rate Exposure		
		coefficients with T = before, during and after the crisis period		
		1994/07-1997/06	1997/07-1998/12	1999/01-2001/12
Parameter		Before	During	After
Size	a1	0.000	0.000	0.000
		(-1.073)	(1.402)	(-0.424)
Export Ratio	a2	0.351	**1.636***	-0.183
		(1.213)	(4.358)	(-0.240)
Debt to Equity	a3	0.566	**-0.349***	0.000
		(0.958)	(-3.865)	(-0.218)
Financial Hedge	a4	**1.287***	-0.041	0.180
		(1.792)	(-0.230)	(0.382)
Operational Hedge	a5	-0.239	**-1.970***	-1.132
		(-0.124)	(-4.295)	(-1.548)
R-square		0.530	0.945	0.450
No. of Observation		10	10	10

Panel (B) Thai Baht Exchange Rate Exposure				
		coefficients with T = before, during and after the crisis period		
		1994/07-1997/06	1997/07-1998/12	1999/01-2001/12
Parameter		Before	During	After
Positive Exposure				
Size	a1	0.000	0.000	n/a
		(-0.908)	(1.072)	
Export Ratio	a2	**1.863****	-0.100	n/a
		(1.986)	(-0.176)	
Debt to Equity	a3	0.106	0.323	n/a
		(0.268)	(0.552)	
R-square		0.695	0.584	n/a
No. of observations		8	5	4
Negative Exposure				
Size	a1	n/a	0.000	0.000
			(4.004)	(0.242)
Export Ratio	a2	n/a	**0.782*****	-0.193
			(2.891)	(-0.173)
Debt to Equity	a3	n/a	0.088	0.000
			(1.208)	(-0.265)
R-square			0.948	0.139
No. of Observation		2	5	6

n/a data is not available due to inefficient number of observations.

*Statistically significant at the 10 percent level

**Statistically significant at the 5 percent level

***Statistically significant at the 1 percent level

Table 4: Hedging Effect and Determinants of the Exchange-Rate Exposure of Thai Food and Beverage Industry

This table reports estimates of the relationship between the exposure coefficients $\hat{\beta}_{xi}$ and the variables that are proxies for firms hedging incentives, such as the firm's market value of equity (SIZE), export ratio (EXP), and debt to its market value of equity (DE). Their empirical relationship is described as below:

$$\hat{\beta}_{xi}^{h} = a_0 + a_1 \mathrm{SIZE} + a_2 \mathrm{EXP} + a_3 \mathrm{DE} + \omega_{ai,\,T}$$
$$\hat{\beta}_{xi}^{nh} = a_4 + a_5 \mathrm{SIZE} + a_6 \mathrm{EXP} + a_7 \mathrm{DE} + \omega_{ai,\,T}$$

where h indicates firms that involve in financial hedge. nh indicates firms that not involve in financial hedge.

		Thai Baht Exchange Rate Exposure		
		coefficients with T = before, during and after the crisis period		
		1994/07-1994/06	1997/07-1998/12	1999/01-2001/12
Parameter		Before	During	After
Hedge				
Size	*a1*	0.000	0.000	0.000***
		(-0.660)	(-1.002)	(-63.454)
Export Ratio	*a2*	0.824	0.177	**1.497***
		(0.605)	(0.120)	(37.142)
Debt to Equity	*a3*	0.037	-0.480	**-0.063***
		(0.440)	(-0.481)	(-14.863)
R-square		0.671	0.729	0.999
No. of Observation		5	5	5
Non-hedge				
Size	*a4*	0.000	0.000	0.000***
		(-0.002)	(1.000)	(-2.336)
Export Ratio	*a5*	**-1.254***	0.454	**-0.743***
		(-1.948)	(0.242)	(-4.890)
Debt to Equity	*a6*	**1.810***	-0.082	0.000**
		(5.781)	(1.000)	(-2.170)
R-square		0.919	0.612	0.962
No. of Observations		5	5	5

*Statistically significant at the 10 percent level

**Statistically significant at the 5 percent level

***Statistically significant at the 1 percent level

Table 5 : Logit regression estimates of the likelihood of using financial hedges

The regression estimates of the relation between the likelihood that a firm uses financial hedges to hedge and proxies for incentives to hedge and proxies for foreign exchange exposure. The sample consists of firms listed on the Stock

Exchange of Thailand. The dependent variable is set to one of the firm uses financial hedges to hedge foreign exchange (FH) exposure. The explanatory variables are: foreign-exchange exposure beta ($\hat{\beta}_{xi}$), firm size (SIZE), export ratio (EXP), and debt to equity ratio (DE).

$$FH = h_0 + h_1 SIZE + h_2 EXP + h_3 DE + h_4 D \hat{\beta}_{xi} + \omega_{ri,T}$$

where D presents a dummy variable that takes the value of one if beta exposure, $\hat{\beta}_{xi}$, is positive and zero if otherwise. The t-statistics are for the logistic coefficients, which are in the parentheses

Panel (A): Thai Baht Exchange Rate Exposure				
		Coefficients with T = before, during and after the crisis period		
		1994/07-1997/06	1997/07-1998/12	1999/01-2001/12
Parameter		Before	During	After
Size	h1	0.000	0.000	0.000
		(1.225)	(0.977)	(-1.107)
Export Ratio	h2	-0.396	0.730	-0.937
		(-0.916)	(1.025)	(-1.378)
Debt to Equity	h3	-0.117	-0.085	-0.001
		(-0.584)	(-0.288)	(-1.226)
Beta Exposure	h4	**0.280***	-0.049	-0.129
		(1.960)	(-0.092)	(-0.313)
R-square		0.477	0.355	0.399
No. of Observation			10	

*Statistically significant at the 10 percent level
**Statistically significant at the 5 percent level
***Statistically significant at the 1 percent level

Before the Crisis: 1994/07-1997/06 (for comparison)

In 1996, before the crisis, Thai baht was fixed at around 25 baht per one U.S. dollar. As a result of high inflation rate, Thailand starts to loss its labor intensive manufactured goods. Total productive growth rate becomes negative. Thai exporter had a hard time selling products in a depress market.

With the creation of the Bangkok International Banking Facility to facilitate across to foreign credit, investor borrows in foreign currency at the rates lower

than the domestic. Financial institute borrow short term foreign dominated debt and lend long term project. Funds were misallocated to financial speculative investments which mostly are in nonproductive investment. This period is when firm starts to borrow short term foreign debt. In Table 2, coefficient of Debt to Equity ratio yields significant a positive sign of 1.810. Firm with high leverage and without financial hedging increases an impact from exchange exposure.

During the Crisis: 1997/07-1998/12

Thai baht depreciate to around 55 baht per a dollar as the highest in January 1998. The results in Table 3, Panel A shows that export ratio has significant positive relationship with exchange rate exposure during the crisis period. By separate sample into positive and negative exposure, the evidence in Table 3 Panel B presents that firm with negative exposure dominate the entire sample where exporting increase exchange exposure. The relationship between debt to equity ratio and exposure is negative. This is because an increase in leverage, firm has high possibility of financial distress. Thus, firm tend to hedge and reduce its foreign exchange exposure.

After the Crisis: 1999/01-2001/12

The recovery began in 1999 as the economy picked up. By June, annual growth in manufacturing increase by 8%, exports and imports start to pick up. In December GDP growth increases by 3-4%.[4] Debt to Equity ratio increases to 118.7 from 1997 to 1999. The results in Table 4 reveal that with an involvement in financial hedging exposure is reduced for firm with higher debt position but increase for firm with higher export.

The sample in Table 4 is separated into two groups. The first group is firms that involve in financial hedging. The second group is for non-hedging firms. Under firms with financial hedging, four of five firms are not exporter. They revenue is generated from domestic market. The coefficient of debt to equity ratio is significant a negative sign at -0.063. That is to say domestic firms do hedge on debt position and can reduce exposure. The significant coefficient of

export ratio at positive sign of 1.497 reflects only from one of five firms.

For non-hedging firms, coefficient of export ratio that yields significant a negative sign of -0.743 can be interpreted as the higher the firm export, the lower the exposure. Four out of five firms in the sample are exporters. These exporting firms are not engage in hedging. It is simply because firms experience higher revenue during great depreciation of currency; therefore, there is no need for hedging.

V. Concluding Remarks

This case study provides an alternative way to analyze the firm's exposure in Thailand food and beverages industry. An analysis of the determinants of a firm's exchange rate exposure is done by examining the stock return of the firms in foods and beverages industry through the impact of firm size, foreign sale, and debt to equity. These empirical findings bring to the conclusion that there is no pattern of firm behavior on hedging activity. Firm's exposure can be determined from firm's export ratio and debt to equity only during and after the crisis period. However, the results robust across three sample periods.

When consider firm's incentive to hedge, firm's characters do not significantly explain firm's decision to engage in financial hedging. Operational hedging significantly reduces the level of exposure during the crisis period.

Overall the results provide evidence that exchange rate movements do affect firm value in a manner consistent with the theory and event of the Asian financial crisis in 1997, and that exchange rate movements have an economically large impact on average firm stock return in different subperiods. These results help to shape the exposure literature of multinational as well as domestic firms doing foods and beverages in Thailand.

Notes

(1) Thailand Public Relations Department
(2) The World Bank (2001)
(3) Due to low volatility of return on exchange rate during fixed exchange rate regime before the crisis period, the purpose of including the first period is for a comparison.
(4) Bank of Thailand

References

Allayannis, G, Ihrig J, and Weston, J, (2001), Exchange-Rate Hedging: Financial versus Operational Strategies, *The American Economic Review*, Vol. 91, No.2

Bartov Eli and Bodnar Gordon, (1994) "Firm Valuation, Earnings Expectations, and the Exchange-Rate Exposure Effect," The Journal of Finance, vol. XLIV, No. 5, December

Bodnar G. M, and Marston R.C., (2000), A Simple Model of Foreign Exchange Exposure, working paper

Bodnar G. M. and Gentry W. M., (1993), Exchange rate exposure and industry characteristics: Evidence from Canada, Japan and U.S. *Journal of International Money and Finance*, vol. 12, pp 29-45

Bodnar G. M and Wong, M. H, (2000) Estimating Exchange Rate Exposure: Some "weighty" issue, *NBER*, working paper no. 7497

Carter D. A., Pantzalis C., and Simkins B. J. (2003) , Asymmetric Exposure to Foreign Risk: Financial and Real Option Hedges Implemented by U.S. Multinational Corporations, online article

Chamberlain S., Howe John S., and Popper Helen, (1996), The Exchange Rate Exposure of U.S. and Japanese Banking Institution, The Wharton Financial Institutions Center, the Working Paper Series

Choi Jongmoo and Prasad Anita Mehra, (1995), Exchange Risk Sensitivity and Its Determinants: A Firm and Industry Analysis of U.S. Multinationals, *Financial Management*, Vol. 24, no. 3, Autumn 1995, p 77-88.

Choi, Jongmoo, Hiraki, Takato and Takezawa Nobuya, (1998), Is Foreign Exchange Risk Priced in the Japanese Stock Market?, Journal of Financial and Qunatitative Analysis, vol. 33, No. 3, September

Chow Edward, Lee Wayn, and Soil Michael, (1997), The Exchange Rate Risk Exposure of Asset Return, The Journal of Business, Vol 70, No. 1, January, p 105- 123

Griffin, J and Stulz R, (2001), International Competition and Exchange Rate Shocks: A Cross-Country Industry Analysis of Stock Return, The Review of Financial Studies, Vol 14, No. 1, 215-241

He, Jia and Ng, Lilian, (1998), The Foreign Exchange Exposure of Japanese Multinational Corporations, *The Journal of Finance*, Vol. 53, No.2

Ihrig Jane and Prior David, (2003), The Effect of Exchange Rate Fluctuations on Multinationals' Return, International Financial Discussion Paper (IFDP)

Jorion Philippe, (1990), The Exchange-Rate Exposure of U.S. Multinationals, *The Journal of Business*, Vol. 63, no. 3, July, 331-345

Marston, R.C, (1996), The Effect of Industry Structure on Economic Exposure, NBER paper

Muller A., and Verschoor W.F.C, (2004), Asian Foreign Exchange Risk Exposure, working paper, article online available at SSRN

Nguyen, H., Faff, R., and Marshall, A., (2004) Exchange Rate Exposure, Foreign Currency Derivatives and the Introduction of the Euro: French Evidence, article online,

Pantzalis Christos, Simkins, Betty J. and Laux Paul A, (2001), Operational Hedging and the Foreign Exchange Exposure of U.S. Multinational Corporations, *Journal of International Business Studies*, 32, fourth Quarter 2001): 793-812

Parsley D.C., and Popper H., (2003), Exchange Rate Pegs and Foreign Exchange Exposure in East and South East Asia, Vanderbilt University, Financial Markets Research Center Working Paper no. 0218

The World Bank (2001), Back from the Brink: Thailand's Response to the 1997 Economic Crisis.

Tufano, Peter, (1998), The Determinants of Stock Price Exposure: Financial Engineering and the Gold Mining Industry, *The Journal of Finance*, vol. 53, No. 3; pp 1015-1052

Yoon, Sung-Wook, (2003), Foreign Exchange Exposure of Korean Corporations Before and After the Asian Crisis, Doctor Dissertation from University of Missouri

Foreign Exchange Exposure:
Evidence of Thailand Foods and Beverages Industry

<Summary>

Suvisa Vathananond

This research investigates foreign exchange exposure of Thai non-financial firms listed in Stock Exchange of Thailand in food and beverages industry before, during and after the Asian financial crisis using firm-level data from 1994 to 2001. Firms are positively exposed to foreign exchange risk before and during the crisis but negatively exposed after the crisis period. Foreign exchange risk associates with random where strong and weak can be equally risky. This research simply separates the sample into firms with positive and negative exposure. The research found that none of both sample dominate the industry. The extent to which a firm is exposed to changes in exchange rate can be explained by firm's financial characters such as export ratio, firm size, leverage, and hedging activities. Consistent with previous research, the results show that foreign involvement and leverage can significantly explain foreign exchange exposure. Furthermore, for firm managing currency risk, there is some evidence of a favorable on operational hedging to significantly reduce level of exposure.